SuperMOS – SOT-323 60V BV_{DSS}, 1.85Ω $R_{DS(on)}$, N-channel MOSFET

1. Description

The 2N7002PW is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product 2N7002PW is Pb-free.

2. Features

- 60V, $R_{DS(ON)}$=1.85Ω(TYP.) @V_{GS}=10V
  $R_{DS(ON)}$=2.05Ω(TYP.) @V_{GS}=4.5V
- Use trench MOSFET technology
- High density cell design for low $R_{DS(on)}$
- ESD Protection - HBM: 2kV
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
2N7002PW	SOT-323	72KQ	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

Table-1 Ordering information

5. Pin Configuration and Functions

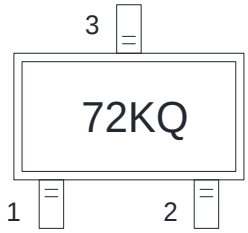
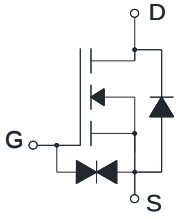
Pin	Function	Outline	Circuit Diagram
1	Gate		
2	Source		
3	Drain		

Table-2 Pin configuration

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 ℃ ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_A=25℃	I_D	0.3	A
	T_A=100℃		0.2	
Maximum Power Dissipation		P_D	350	mW
Pulsed Drain Current		I_{DM}	1.2	A
Operating Junction Temperature		T_J	150	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation			
Parameter	Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	357	°C/W

Electrical Characteristics

At TA = 25℃ unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	60			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			1.0	uA
Gate-to-source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±10	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS}, I_D=250uA	1.0	1.6	2.0	V
Drain-to-source On-resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=0.3A		1.85	2.2	Ω
		V_{GS}=4.5V, I_D=0.2A		2.05	3.0	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS}=0V, f=1MHz, V_{DS}=25V		28		pF
Output Capacitance	C_{OSS}			11		
Reverse Transfer Capacitance	C_{RSS}			4		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=4.5V, V_{DS}=10V, I_D=0.3A		1.8		nC
Gate-to-Source Charge	Q_{GS}			0.3		
Gate-to-Drain Charge	Q_{GD}			0.6		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(ON)}$	V_{GS}=10V, V_{DS}=10V, I_D=0.2A, R_G=10Ω		2		ns
Rise Time	t_r			15		
Turn-Off Delay Time	$t_{d(OFF)}$			7		
Fall Time	t_f			20		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V_{SD}	V_{GS}=0V, I_S=0.3A			1.5	V

7. Typical Characteristic

Figure 1: Output Characteristics

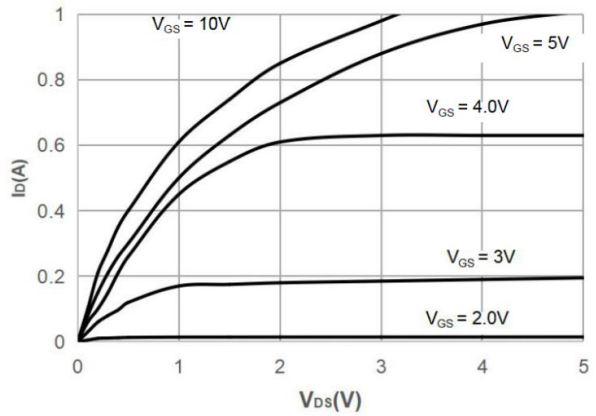


Figure 2: Typical Transfer Characteristics

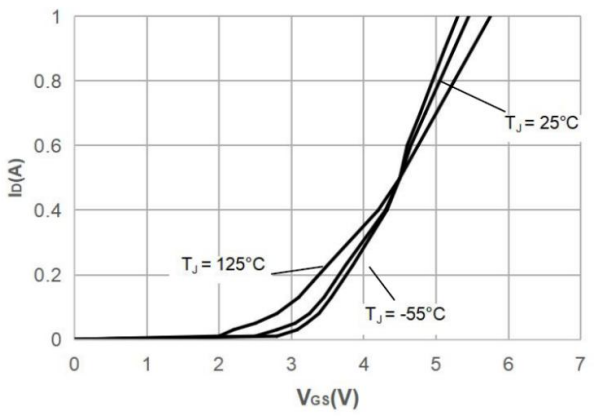


Figure 3: On-resistance vs. Drain Current

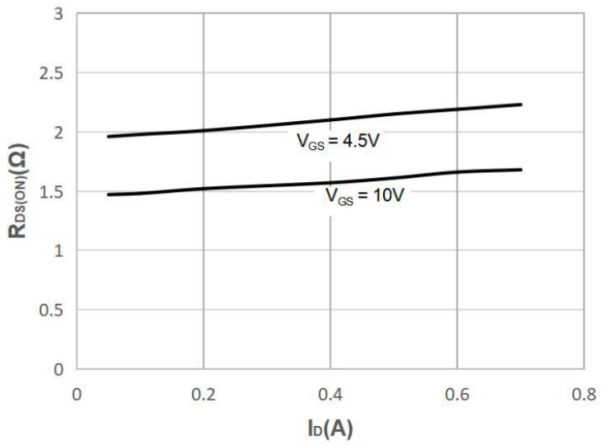


Figure 4: Body Diode Characteristics

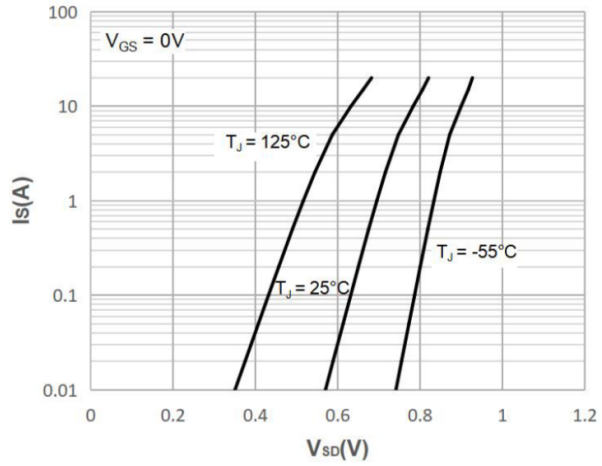


Figure 5: Capacitance Characteristics

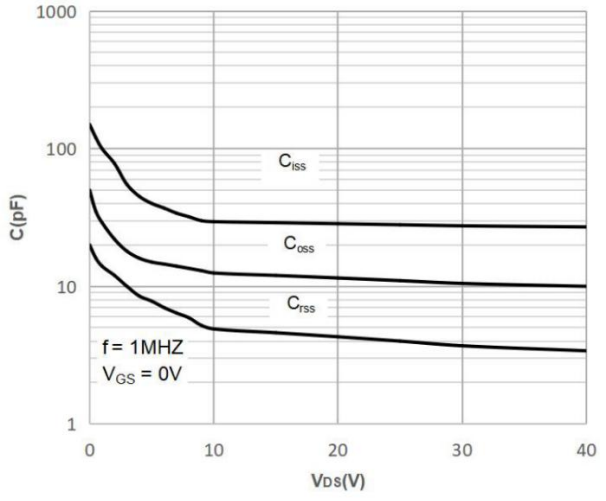


Figure 6: Normalized on Resistance vs Junction Temperature

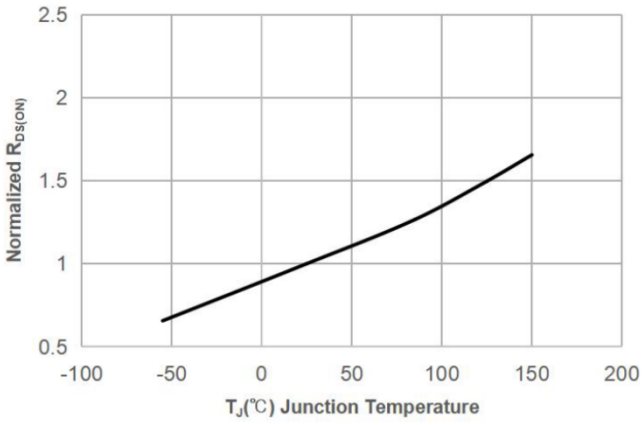
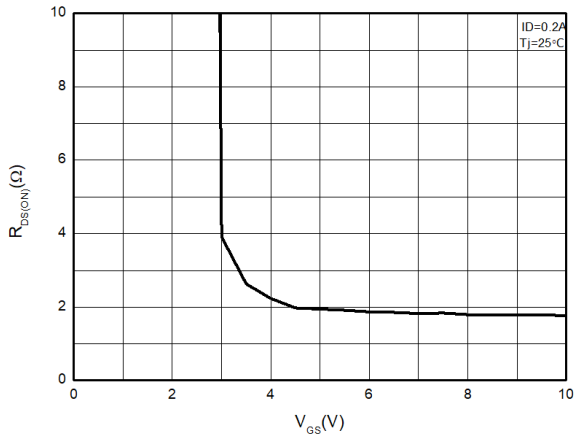
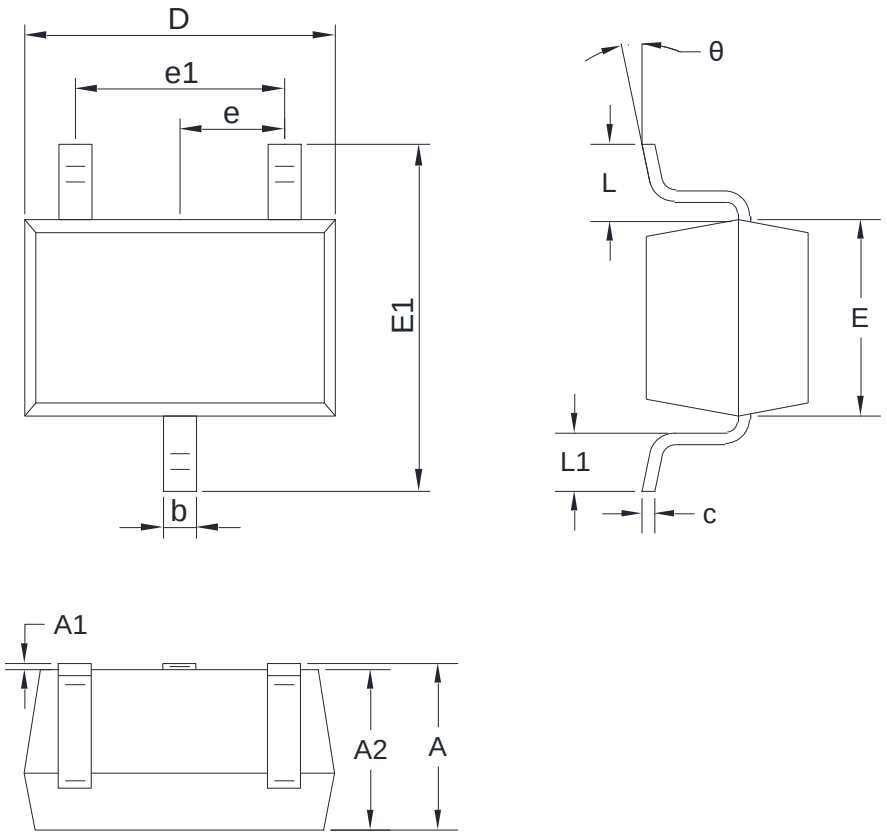


Figure 7: on-Resistance vs. Gate to Source	
	

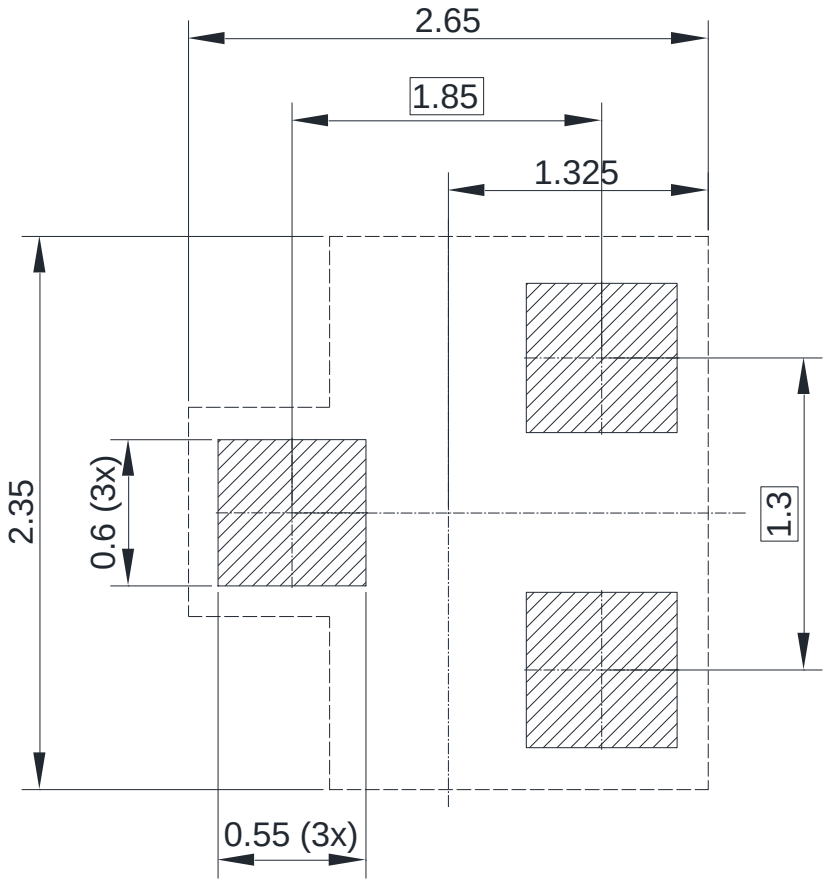
8. Dimension (SOT-323)

POD(Z)



Symbol	Millimeters		Symbol	Millimeters	
	Min	Max		Min	Max
A	0.80	1.00	E1	2.05	2.35
A1	0.00	0.10	e	0.65 TYP	
A2	0.80	0.90	e1	1.20	1.40
b	0.20	0.40	L	0.45 REF	
c	0.08	0.15	L1	0.26	0.46
D	2.00	2.20	θ	0°	8°
E	1.15	1.35			

9. Recommended Soldering Footprint



DIMENSIONS: MILLIMETERS

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